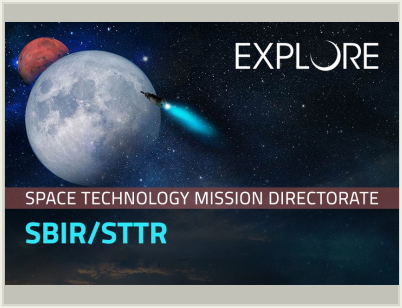
Efficient Design and Optimization of a Flow Control System for Supersonic Mixed Compression Inlets, Phase II

Completed Technology Project (2010 - 2012)

Project Introduction

SynGenics Corporation proposes a program that unites mathematical and statistical processes, Response Surface Methodology, and multicriterial optimization methods to design optimized, failsafe technologies to control shockwave-boundary-layer interactions and realize improvements in supersonic inlet performance and vehicle efficiency. The innovation described in this proposal is the development of SynGenics Optimization System (SynOptSys), a software product that will provide expert guidance to the user in the capture and documentation of response variables, identification of factors, and statistical design of experiments (DOE). Furthermore, the software system will assist the user in the analysis of DOE data, model building, diagnostics, and system optimization. The software will implement multicriteral optimization methods developed by SynGenics personnel, which will enable the simultaneous optimization of the flow-control (FC) system with respect to multiple, competing inlet-system requirements. SynOptSys will help designers and product developers overcome the barriers that prevent them from using powerful mathematical and statistical techniques to develop better products in a less costly manner. SynOptSys will implement the final task in a suite of methods developed by SynGenics to transform a need and candidate solution concepts to an affordable solution. Use of these powerful techniques enables the development of high-value systems. The significance of this program is that it will provide tools necessary to conduct multicriterial, inlet system-level-assessments and optimizations of enabling technologies, including, but not limited to flow-control technologies This program supports the Propulsion Efficiency key research area of the NASA Fundamental Aeronautics Supersonics Program by working to develop inlet FC technologies that will facilitate low TSFC of highly integrated supersonic inlets and improved overall cruise efficiency through reduced inlet drag.



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Small Business Innovation Research/Small Business Tech Transfer

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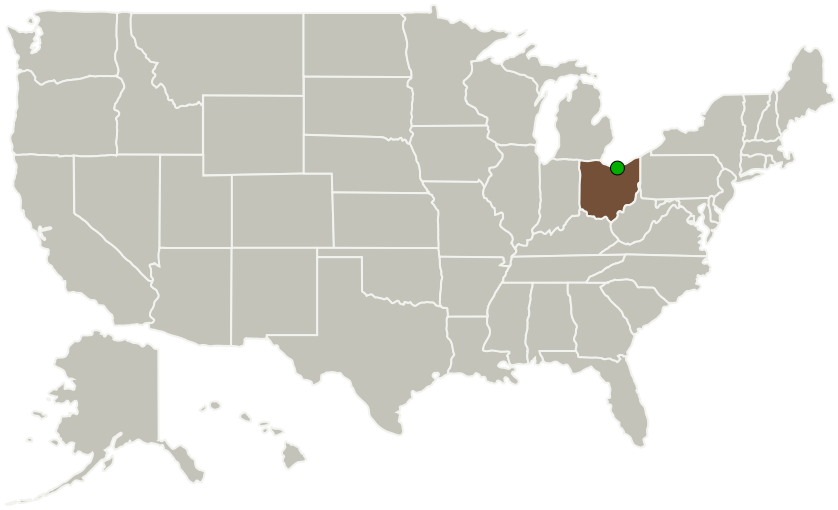
Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
SynGenics Corporation	Lead Organization	Industry Women-Owned Small Business (WOSB)	Delaware, Ohio
Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations
Ohio

Project Transitions

February 2010: Project Start

May 2012: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/138960)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

SynGenics Corporation

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

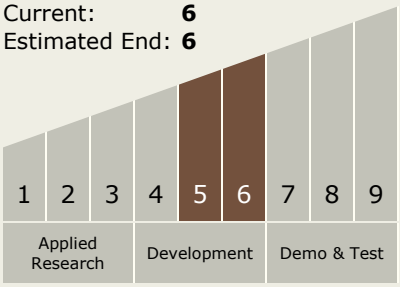
Carlos Torrez

Principal Investigator:

Michelle L Mcmillan

Technology Maturity (TRL)

Start: **5**
Current: **6**
Estimated End: **6**



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Technology Areas

Primary:

- TX15 Flight Vehicle Systems
  - TX15.1 Aerosciences
    - TX15.1.5 Propulsion Flowpath and Interactions

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System